

Lesson 3.5 Extra Practice

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1. Calculate each of the following using long division.

- $(x^3 + 4x + 2) \div (x - 1)$
- $(3x^3 + x^2 + 4x - 5) \div (x + 3)$
- $(2x^4 - 5x^2 + 3) \div (x + 2)$
- $(-3x^4 + 4x^3 - 1) \div (x + 4)$
- $(x^5 + 3x^3 - 5x^2 + 4x + 8) \div (x - 3)$
- $(2x^5 + 4x^4 - 5x^3 - 6x^2 + 2x - 4) \div (x + 3)$

2. Calculate each of the following using synthetic division.

- $(x^3 - 5x^2 - 4) \div (x - 3)$
- $(-2x^3 + 5x - 6) \div (x + 1)$
- $(-x^4 + 7x^2 - 1) \div (x + 4)$
- $(4x^4 - 5x^3 + 2x^2 - 3x + 6) \div (x - 4)$
- $(x^5 - 1) \div (x + 1)$
- $(-5x^5 + 3x^4 - 4x^3 + 4x^2 - 5x + 8) \div (x - 1)$

3. Each divisor was divided into another polynomial, resulting in the given quotient and remainder. Find the other polynomial (the dividend).

- divisor: $x + 4$; quotient: $x^2 - 4x + 10$; remainder: 5
- divisor: $-3x + 1$; quotient: $3x^3 + 5x + 8$; remainder: 0
- divisor: $2x - 3$; quotient: $4x^3 - 3x^2 - 4x + 7$; remainder: $x + 5$
- divisor: $x^2 + 5x - 8$; quotient: $x^4 - 5x^3 + 3x^2 - 7x + 11$; remainder: $2x + 9$

4. Determine the remainder, r , to make each multiplication statement true.

- $(3x - 4)(x - 7) + r = 3x^2 - 25x + 10$
- $(x - 5)(x + 6) + r = x^2 + x - 1$
- $(x + 2)(x^2 - 4) + r = x^3 + 2x^2 - 3x - 7$
- $(x^3 - 2)(3x^2 + 1) + r = 3x^5 + x^3 - 6x^2$

5. Each dividend was divided by another polynomial, resulting in the given quotient and remainder. Find the other polynomial (the divisor).

- dividend: $3x^3 + 7x^2 + 2x + 2$; quotient: $3x^2 + x$; remainder: 2
- dividend: $8x^3 + 3x^2 - 4x + 1$; quotient: $8x^2 + 27x + 77$; remainder: 232
- dividend: $x^4 + x^3 - 7x^2 + 6x - 2$; quotient: $x^3 - 3x^2 + 5x - 14$; remainder: 54
- dividend: $-2x^4 - 5x^3 + 2x^2 + 3x - 1$; quotient: $-2x^3 - 7x^2 - 5x - 2$; remainder: -3

6. Determine whether each binomial is a factor of the given polynomial.

- $x + 2$, $x^3 + 4x^2 - 2x - 10$
- $x - 3$, $x^4 - 5x^3 + 10x^2 - 5x - 21$
- $x - 4$, $x^4 - 3x^2 + 8$
- $3x - 1$, $3x^4 + 5x^3 + x^2 + 11x - 4$
- $2x - 3$, $2x^5 + 3x^3 + 6$
- $4x + 1$, $4x^6 + x^5 + 8x^3 + 2x^2 + 4x + 1$

7. The volume of a rectangular box is $(x^3 + 3x^2 - 6x - 8) \text{ cm}^3$. The box is $(x + 4) \text{ cm}$ long and $(x + 1) \text{ cm}$ wide. How high is the box?

8. a) $4x^3 + 10x^2 + px - 2$ is divisible by $x + 2$. There is no remainder. Find the value of p .

b) When $x^5 + 2x^4 + x^3 - 3x^2 + k$ is divided by $x^2 + 2$, the remainder is $x + 15$. Find the value of k .

9. If the divisor of a polynomial, $f(x)$, is $x + 2$, then the quotient is $x^2 - 7x + 12$ and the remainder is -1 .

- Write an equation for $f(x)$.
- Rewrite the equation from part a) by factoring $x^2 - 7x + 12$.
- Graph $f(x)$ using your results from part b).